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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/954,806	09/18/2001	Hiroiyuki Akashi	09792909-5185	8207

26263 7590 04/13/2005

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 04/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/954,806

Applicant(s)

AKASHI ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2005.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 4-7, 13 and 14 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1, 4-7 and 13-14 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 18 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

This office submission is being provided in reply to the amendment filed 02/14/05. The applicants have overcome the 35 USC 102/103 rejection. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims (including newly added claims 13-14) are finally rejected over the same art as set forth infra and for the reasons of record.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4-7 and 13-14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the EP 997960 reference.

3. The instant claims are directed to a secondary battery wherein the disclosed inventive concept comprises the specific ratio of the electrode layer thickness. Other limitations include the specific thickness range; the negative electrode material; the light metal and the particular electrolyte.

As to claims 1 and 13-14:

The EP'960 reference teaches a non-aqueous electrolyte secondary battery comprising an electrode group (2) including a positive electrode (12), a negative electrode (13) including a material for absorbing-desorbing lithium, and a separator (3), a non-aqueous electrolyte impregnated in the electrode group and including a non-aqueous solvent and a lithium salt (electrolyte) dissolved in the solvent (ABSTRACT/section 0008).

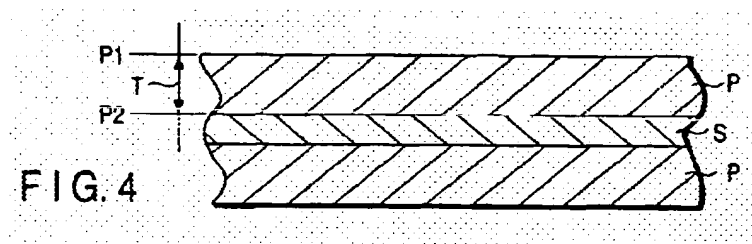
As to the limitation that the positive electrode includes a positive electrode mixture layer capable of occluding and releasing light metal, the EP'960 reference teaches that the positive electrode active material are various oxides such as lithium manganese composite oxide, lithium-containing nickel oxide, **lithium-containing cobalt oxide, lithium-containing nickel cobalt oxide**, lithium containing iron oxide, and lithium containing cobalt oxide, of these materials, **lithium containing cobalt oxide  $\text{LiCoO}_2$ , lithium containing nickel cobalt oxide  $\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$** , and lithium manganese composite oxide  $\text{LiMn}_2\text{O}_4$  **are preferably** (section 0019). *Although the instant claims do not recite the particular composition of the positive electrode, it is noted that the positive electrode active materials of the prior art has identical product compositions as the positive electrode active material disclosed by the applicant (see applicants' specification, application 09/954806, page 6, line 24 to page 7, line 12).* Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property i.e. capable of occluding and releasing light metal, is necessarily present in the prior art active material.

In addition, it is disclosed that **the negative electrode layer** containing an active material is made from carbon material which absorbs lithium. Examples of this carbon material are a **graphitized material** and carbonaceous material such as **graphite** (section 0027). Accordingly,

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products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property i.e. capable of precipitating and dissolving light metal thereon, is necessarily present in the prior art active material.

Figure 4 shows the thickness of a positive electrode active material layer wherein P represents the electrode layer (section 0119).



It is also disclosed that the positive electrode has a structure in which an electrode layer containing an active material is carried by one or both surfaces of the collector (section 0018). It is also disclosed that the negative electrode has a structure in which an electrode layer containing an active material is carried by one or both surfaces of the collector (section 0026)

The EP'960 reference teaches that the thickness of the positive electrode layer should be 10-100 Tm; it follows that where positive electrode layers are formed on both surfaces of the collector, one positive electrode layer has a thickness of 10-100 Tm, naturally, the total thickness of the two positive electrode layers formed on both surfaces of the collector is 20-200 Tm. It is also disclosed that **the upper limit in the thickness is preferably 85  $\mu\text{m}$**  (section 0119/ 0158) (*←emphasis added*). Hence, the EP'960 reference envisions the claimed thickness, at least, from 80 to 100 Tm when one layer is formed, and at least, from 80 to 200  $\mu\text{m}$  when two layers are formed thereon.

The EP'960 reference teaches that the thickness of the negative electrode layer should be 10-100 Tm; it follows that where negative electrode layers are formed on both surfaces of the collector, one negative electrode layer has a thickness of 10-100  $\mu\text{m}$ , naturally, the total thickness of the two negative electrode layers formed on both surfaces of the collector is 20-200 Tm. It is also disclosed that **the upper limit in the thickness is preferably 85  $\mu\text{m}$**  (section 0125/ 0161) (*←emphasis added*). Hence, the EP'960 reference envisions the claimed thickness, at least, from 80 to 100 Tm when one layer is formed, and at least, from 80 to 200  $\mu\text{m}$  when two layers are formed thereon.

Thus, given that the EP'960 reference has clearly disclosed that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85  $\mu\text{m}$ , as well, in general, electrode layers having a thickness of 10-100  $\mu\text{m}$ , it is fairly reasonable to contend that the EP'960 reference envisions at first the claimed thickness, and consequently, the claimed ratio A/B. For instance, if the upper limit in the thickness for the positive electrode is chosen to be 85  $\mu\text{m}$ , then the thickness of the negative electrode can be thus chosen to be 81  $\mu\text{m}$  which still satisfies a preferred electrode thickness; or in the other hand, if the positive electrode thickness is chosen to be 100  $\mu\text{m}$ , then the thickness of the negative electrode can be thus chosen to be 96  $\mu\text{m}$  which is still within the generally disclosed range. In this regard, it is noted that this examiner's position is taken in light of the specific electrode thickness exemplified in TABLE 6 (See portions of TABLE 6 below) which shows positive electrodes and negative electrodes having different thickness dimension. Therefore, the EP'960 reference does not strictly require that the thickness dimension of both electrodes (i.e. the positive electrode and the negative electrode) be identical or the same. In other others, the EP'960 reference at once envisages different thickness for both

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electrodes. Thus, the battery of the EP'960 still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.038.

Table 6 below shows specific examples wherein the thickness of the positive electrode differs from the thickness of the negative electrode:

Table 6

	Capacity (Ah)	Thickness of one layer of positive electrode ( $\mu\text{m}$ )	Thickness of one layer of negative electrode ( $\mu\text{m}$ )
Example 37	0.38	80	80
Example A	0.35	87	90
Example B	0.05	8	8
Comparative example 12	0.30	105	108

**Examiner's note:** As to the limitation that the capacity of the negative electrode is expressed by the sum of a first capacity component by occluding and releasing light metal and a second capacity component by precipitating and dissolving light metal, since applicants disclose:

a) the battery of the present invention is engineered in order to attain the second component, wherein such battery engineering relies on the battery featuring a negative electrode comprising a graphitic material with certain charge capacity and a positive electrode of Li-oxide based material;

b) that during the process of charging, lithium metal starts to precipitate in the negative electrode at the point where the open circuit voltage (battery voltage) is lower than the overcharge voltage. In other words, the capacity of the negative electrode is expressed by the sum of the capacity component of occluding/releasing lithium and the capacity component of

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*precipitating /dissolving lithium metal. The overcharge voltage means an open circuit voltage when the battery is overcharged, and indicates the voltage higher than the open circuit voltage of the full charged battery (see applicants' specification, application 09/954806, page 14, lines 13-24),*

*c) the ratio of the thickness (A/B) varies depending on the capacities of the positive electrode mixture layer and the negative electrode mixture layer. If the ratio (A/B) is equal to or more than 0.92, lithium metal can be stably precipitated in the negative electrode in the state where the open circuit voltage is lower than the overcharge voltage, and a high energy density and an excellent cycle characteristic can be obtained (see applicants' specification, application 09/954806, page 15, lines 9-23),*

*Thus, it asserted that having shown the battery of the prior art does: 1) include the same positive electrode and negative material composition; and, b) meet such ratio (A/B) requirement (i.e. the ratio (A/B) of the thickness A of the positive electrode mixture layer and thickness B of the negative electrode mixture layer is 0.92 or more), the above-mentioned battery characteristic and/or function is thus inherent as the battery structure recited in the reference is substantially identical to that of the instant claims, and therefore, claimed properties or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art battery seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in the battery described in the reference, and that it would be so recognized by persons of ordinary skill.*



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Concerning claim 4:

It is disclosed that the negative electrode layer contains an active material being made from carbon material which absorbs lithium. Examples of this carbon material are a graphitized material and carbonaceous material such as graphite (section 0027).

As to claim 5:

The EP'960 reference teaches that the positive electrode active material are various oxides such as lithium manganese composite oxide, lithium-containing nickel oxide, lithium-containing cobalt oxide, lithium-containing nickel cobalt oxide, lithium containing iron oxide, and lithium containing cobalt oxide, of these materials, lithium containing cobalt oxide  $\text{LiCoO}_2$ , lithium containing nickel cobalt oxide  $\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$ , and lithium manganese composite oxide  $\text{LiMn}_2\text{O}_4$  are preferably (section 0019). *Thus, the light metal includes lithium.*

As to claim 6-7:

The EP'960 reference teaches that examples of the electrolytic salt contained in the non-aqueous electrolyte are lithium salts such as  $\text{LiPF}_6$  which is also most preferred (sections 0051). It is disclosed that the amount of the electrolytic salt dissolved in the non-aqueous solvent should desirably be 0.5 to 2.0 mol/l (section 0052). *Comparative Examples 4 and 6* shows that  $\text{LiPF}_6$  was dissolved in a mixed solvent in an amount of 1 mol/L and 0.8 mol/L, respectively (sections 0214 and 0216/Table 2). It is noted that the non-aqueous solvent is unspecified for purposes of determining its mass of substance per unit volume (density). Thus, the specific example in the prior art is understood to be within the claimed range absent that no specific nonaqueous electrolyte solvent is claimed.

The EP'960 reference disclose a secondary battery according to the abovementioned aspects. However, the EP'960 reference does not expressly disclose the specific electrode thickness ratio  $A/B$ .

In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the battery of the EP'960 reference by having the specific electrode thickness ratio  $A/B$  as the EP'960 reference itself discloses that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85  $\mu\text{m}$ , as well, in general, electrode layers having a thickness of 10-100  $\mu\text{m}$ , and these thickness are preferable simply because if the electrode layer is thicker than the specific dimension, the non-aqueous electrolyte concentrates on the surface of the positive electrode at rapid charge and at rapid discharge, and as a result, the electrode reaction scarcely proceeds inside the electrode, leading to a shortened cycle life; in addition, where the thickness falls within this range, the large discharge characteristics and the cycle life are markedly improved. Thus, one of ordinary skill in the art would find good motivation to make positive electrodes and negative electrodes within the claimed range. Hence, the EP'960 reference directly teaches the electrode thickness within the claimed range, and still meets the claimed ratio ( $A/B$ ) requirement of being equal to or greater than 1.038.

Moreover, where the only difference between the prior art and the claims is a recitation of relative dimensions (*i.e. changes in size/proportion*) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art device/element/member, the claimed device/element/member is not patentably distinct from the prior art device/element/member. That is, limitations relating to the size of the feature/element/member

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are not sufficient to patentably distinguish over the prior art as it is noted that changes in size (*thickness*) is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular thickness of the claimed electrode is significant. *In re Rose* 105 USPQ 237; *In re Rinehart* 189 USPQ 143; *In Gardner v. TEC Systems, Inc.*, 220 USPQ 777 & 225 USPQ 232, (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale).

Likewise, the EP'960 reference recognizes that the electrode thickness per se is a variable which achieves a recognized result, thus, the claimed range of the electrode thickness and thus, the A/B ratio result from the characterization as routine experimentation of an optimum or workable range. Accordingly, the electrode thickness is being construed as a result-effective variable. *In re Aller* 105 USPQ 233, 235; *In re Hoeschele* 160 USPQ 809, *In re Antonie* 195 USPQ 6 (See MPEP 2144.05 II. Optimization of Ranges).

### ***Response to Arguments***

1. Applicant's arguments filed 02/14/05 have been fully considered but they are not persuasive.
2. Although believed unnecessary due to the new grounds of rejection, the examiner likes to address certain applicants' arguments. In response to applicants' arguments that the prior art of record does not disclose the specific ratio (A/B) between the positive electrode and negative electrode, the examiner wishes to point out that given that the EP'960 reference has clearly disclosed that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85  $\mu\text{m}$ , as well, in general, electrode layers having a thickness of 10-100

μm, it is fairly reasonable to contend that the EP'960 reference envisions at first the claimed thickness, and consequently, the claimed ratio A/B. For instance, if the upper limit in the thickness for the positive electrode is chosen to be 85 μm, then the thickness of the negative electrode can be thus chosen to be 81 μm which still satisfies a preferred electrode thickness; or in the other hand, if the positive electrode thickness is chosen to be 100 μm, then the thickness of the negative electrode can be thus chosen to be 96 which is still within the generally disclosed range. In this regard, it is noted that this examiner's position is taken in light of the specific electrode thickness exemplified in TABLE 6 (See portions of TABLE 6 below) which shows positive electrodes and negative electrodes having different thickness dimension. Therefore, the EP'960 reference does not strictly require that the thickness dimension of both electrodes (i.e. the positive electrode and the negative electrode) be identical or the same. In other others, the EP'960 reference at once envisages different thickness for both electrodes. Thus, the battery of the EP'960 still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.038.

3. Additionally, in view of the fact that the EP'960 reference teaches that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm, as well, in general, electrode layers having a thickness of 10-100 μm, and that these thickness are preferable simply because if the electrode layer is thicker than the specific dimension, the non-aqueous electrolyte concentrates on the surface of the positive electrode at rapid charge and at rapid discharge, and as a result, the electrode reaction scarcely proceeds inside the electrode, leading to a shortened cycle life; in addition, where the thickness falls within this range, the large discharge characteristics and the cycle life are markedly improved. Thus, one of ordinary skill in

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the art would find good motivation to make positive electrodes and negative electrodes within the claimed range. Hence, the EP'960 reference directly teaches the electrode thickness within the claimed range, and still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.038. Accordingly, the EP'960 reference recognizes that the electrode thickness per se is a variable which achieves a recognized result, thus, the claimed range of the electrode thickness and thus, the A/B ratio result from the characterization as routine experimentation of an optimum or workable range. Accordingly, the electrode thickness is being construed as a result-effective variable. *In re Aller* 105 USPQ 233, 235; *In re Hoeschele* 160 USPQ 809, *In re Antonie* 195 USPQ 6 (**See MPEP 2144.05 II. Optimization of Ranges**).

4. Moreover, where the only difference between the prior art and the claims is a recitation of relative dimensions (*i.e. changes in size/proportion*) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art device/element/member, the claimed device/element/member is not patentably distinct from the prior art device/element/member. That is, limitations relating to the size of the feature/element/member are not sufficient to patentably distinguish over the prior art as it is noted that changes in size (*thickness*) is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular thickness of the claimed electrode is significant. *In re Rose* 105 USPQ 237; *In re Rinehart* 189 USPQ 143; *In Gardner v. TEC Systems, Inc.*, 220 USPQ 777 & 225 USPQ 232, (**See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale**).

5. The assertion that the prior art of record fails to reveal “*the specific charge capacity/characteristic*” is still insufficient to overcome this rejection. In this regard, it is noted

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that applicants have argued that the battery of the present invention is specifically engineered to avoid the precipitation of lithium metal (in order to attain the specific second capacity component) by simply featuring a battery comprising a negative electrode comprising a graphitic material with certain charge capacity and a positive electrode of Li-oxide based material.

Nevertheless, since the battery of the prior art does include the same positive electrode and negative material composition, the specific characteristic/function of occluding/releasing and/or precipitating/dissolving light metals is inherent because products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property i.e. capable of occluding and releasing light metal, and capable of precipitating and dissolving light metal thereon is necessarily present in the prior art active material.

Therefore, because the examiner has provided a substantive sound basis and a technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art, and therefore, to assert that the specific claimed occluding/releasing and/or precipitating/dissolving light metals characteristics are inherent to the very same nature of the positive electrode and negative electrode material composition of the prior art battery (*as also argued by applicants*). Applicants' attention is particularly directed to the Examiner's Note presented hereinabove (refer to the Examiner's Note in body of the rejection above). In consequence, the prior art's battery seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in the specific method described in the reference, and that it would be so recognized by persons of ordinary skill. As a result, once a reference teaching method appearing

to be substantially identical is made the basis of the rejection, and the examiner presents evidence or reasoning tending to show inherency, the burden shifts to the application to show an unobvious difference. Hence, applicants need to prove the prior art does not necessarily or inherently possess the characteristics, and/or function of his/their secondary battery. *In re Fitzgerald* 205 USPQ 594, 596 and *In re Best* 195 USPQ 430 (See **MPEP 2112. Requirements of Rejection Based on Inherency**).

As a result, the examiner asserts that it is not enough that applicant's representative personally believe that the prior art does not perform or teach such inherently identified characteristic/function. That is to say, the arguments of counsel cannot take the place of evidence in the record. An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of inherent anticipation/obviousness (See **MPEP 2145 Consideration of Applicant's Rebuttal Arguments**).

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro  
Primary Examiner  
Art Unit 1745

  
RAYMOND ALEJANDRO  
PRIMARY EXAMINER